

NOTE

First Report of Nuptial Feeding in Sawflies, *Aneugmenus flavipes* (Norton)
(Hymenoptera: Tenthredinidae)

A deep, transverse concavity or depression is found on the seventh tergite in males of some sawflies of the subfamily Selandriinae (Tenthredinidae), most of which are fern feeders. This structure was first recognized by Malaise (1944: 28, 29, fig. 12) in some species of *Neostromboceros* Rohwer and in *Aneugmenus jacobsoni* (Enslin) from southeastern Asia. Malaise coined the term "*sinus sexualis*" "for this hitherto unnoticed secondary sexual organ of unknown purpose of certain species of the genus *Neostromboceros* Rhw." It is difficult to see the *sinus sexualis* in dried specimens because the abdomen is usually curved up with the anterior and posterior surfaces of the depression pressed together, thus hiding it. Modifications of the abdomen (Figs. 1-2) include the fifth and sixth tergites each divided into two halves by a medial suture and the hind margin of the sixth tergite carinate with two short apically projecting spines at the center; the seventh tergite deeply concave, cut deeply into the abdomen and posteriorly raised into a carinate posterior margin; and the eighth tergite with a large, central, oval, opaque or subopaque, shallowly depressed area. The functions of these modifications have not been documented.

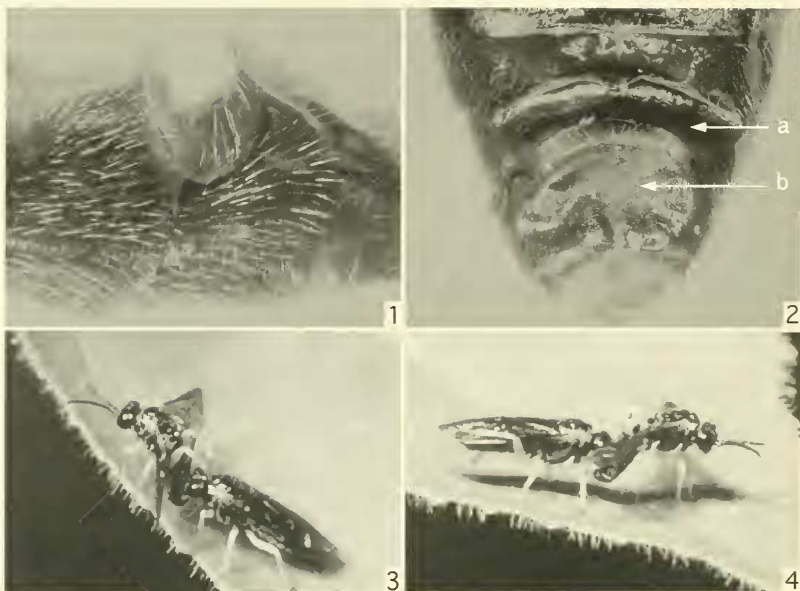
This sexual modification also occurs in males of some New World and Palearctic species of *Aneugmenus* Hartig (DRS, personal observation), though it has not been recorded in the literature. It is present in males of *Aneugmenus floridella* Ross (southeastern U.S.), *A. scutellatus* Smith (southwestern U.S., northern Mexico), unidentified *Aneugmenus* species (Central and South America), *A. japonicus* Rohwer and *A. kiotonis* Takeuchi (Japan), and *A. coronatus* (Klug) and *A. fuerstenbergensis* (Konow) (Europe). We have not seen it in other gen-

era except for *Neostromboceros*. We here report the occurrence of the *sinus sexualis* in *Aneugmenus flavipes* (Norton), a fern-feeding sawfly that occurs in the eastern United States and Canada and provide evidence that the structure serves to transfer glandular secretions from the male to the female.

A pair of *A. flavipes* (Figs. 3-4) were observed by SAM on low foliage in a mixed forest near Tobermory, Ontario, Canada. They were first noticed as they chased each other on the upper surface of a leaf, after which they took the position shown in Figs. 3-4, with the mouthparts of the female firmly affixed to the seventh tergite of the male. This position was held for about a minute, then broken, then reestablished after what appeared to be a brief attempt at copulation. It is not known whether copulation took place prior to the apparent transfer of glandular secretions from the male to the female *A. flavipes*.

We interpret this behavior in *A. flavipes* as the transfer of glandular secretions from male to female. Some other insects are known to transfer nutritional substances to the female both before and after mating. This behavior is well known in tree crickets (*Oecanthus* spp.), males of which produce glandular products in external notal glands. The time females spend feeding on the males' exudates is significantly correlated with egg production (Brown 1997). Some male cockroaches have tergal glands positioned similarly to those of *A. flavipes*, and the female feeds on the products of those glands in the same fashion (Brossut et al. 1975). Males of some soft-winged flower beetles, such as *Anthocomus bipunctatus* Harrer (Malichiiidae), also have glandular areas in a conspicuous depression at the apex of the elytra (SAM, personal observation).

Most sawflies display little or no courtship behavior, as mentioned in some gen-



Figs. 1–4. *Aneugmenus flavipes*. 1, Lateral view of the "sinus sexualis." 2, Apex of abdomen, dorsal view; a = "sinus sexualis" of 7th tergite; b = central, opaque area of 8th tergite. 3–4, Nuptial feeding positions, male in front, female behind.

eral discussions (Benson 1950; Anderbrant 1993; Viitasaari 2002). At most, rapid wing vibration has been observed in some species such as *Hemitaxonus dubitatus* (Norton) (Tenthredinidae: Selandriinae) (Gordh 1975) and *Arge annulipes* (Klug) (Argidae) (Scott 1991). The observations reported here represent the first record of the possible function of the sinus sexualis in male Selandriinae and the first record of nuptial feeding in sawflies, and so far as we know, in Hymenoptera. We hope this will lead to further study of this unusual behavior in *Aneugmenus*, eventual determination of its purpose, and determination of the chemical substances involved.

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